



Proteomics Society, India (PSI)

PSI News Letter Vol. 4 (No. 1) April 2016



Workshop on "Experimental Approaches to Proteomics"

2-5 March, 2016



जीव विज्ञान संस्थान
INSTITUTE OF LIFE SCIENCES
(An Autonomous Institute of the Department of Biotechnology, Govt. of India)

National Symposium and Workshop
on Advances in Proteomics

ILS, Bhubaneswar
March 15-18, 2016

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Editors

Abhijit Chakrabarti
K. Dharmalingam
Utpal Tatu

From the Editors

Dear Members,

The year 2016 has been eventful for PSI till April. The first issue of the Newsletter of 2016 brings you articles on various meetings, workshops and celebration of The Proteomics Day during March 2016 by Prof. K Dharmalingam's group of Aravind Medical Research Foundation in Madurai, Dr. Amol Suryawanshi of Institute of Life Science in Bhubaneswar, Prof. Karutha Pandian, Alagappa University, Karakudi, and Prof. Utpal Tatu in Indian Institute of Science, Bengaluru along with Dr Rajyalakshimi, BMS College of Engineering, Bengaluru.

Ms SagariKa Das of IISER Kolkata and Arabinda Mahanty of ICAR-Central Inland Fisheries Research Institute, Barrackpore, Kolkata contribute to the "Student's Corner" with their narrations on the meeting in ILS, Bhubaneswar.

With Best Wishes

Editors

PS: Please send your contributions for the News Letter to abhijit.chakrabarti@saha.ac.in



From the President, PSI

Dear Members,

We always look forward to the New Year for new beginnings and hope that the year ahead brings in all that we wish for.

This has proven right for Proteomics Society, India.

The Society launched the Journal of Proteins and Proteomics (JPP) as its official journal at a meeting on 18th March 2016 in Delhi on “Frontiers in Proteomics Research: Proteomics Day Celebration. The meeting was organized by Dr. Suman Kundu, Chief Editor of JPP. Members are requested to visit the journal website www.jpp.org.in and contribute manuscripts of their research work to our own journal.

In 2014, the Executive Council of PSI had decided that 18th March every year should be celebrated as Proteomics Day to spread knowledge about proteomics through meetings, symposia, workshops etc. Members were encouraged to organize events on or around that date in March. In 2015 we conducted such events in Mumbai, Pune and Bengaluru. This year we had meetings in Madurai, Bhubhaneshwar, Karaikudi, Delhi and Bengaluru. This Newsletter brings you reports of four of these. It is a good feeling that our PSI members

from University Colleges are coming forward to host/organize these events. I encourage other PSI members to consider holding such meetings in their Institutes/colleges. PSI will support your activities with some financial aid as well as resource persons to conduct lectures/demonstrations.

The 8th Annual Meeting of the Society is scheduled during 14th -17th Dec 2016 in Delhi with Dr Subhra Chakraborty as the Convener. Do ensure that you organize yourselves to attend the meeting. We look forward to meeting our PSI members in Delhi.

With Best Wishes

Dr. Surekha Zingde

(surekha.zingde@gmail.com)

Proteomic Society, India (PSI)

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Meeting reports

Workshop on Experimental Approaches to Proteomics

March 2-5, 2016

Aravind Medical Research Foundation, Madurai



Dr. Jeya Maheshwari---Convener

The workshop on “Experimental Approaches to Proteomics” was conducted during 2-5 March 2016 at Aravind Medical Research Foundation. The main objective of this workshop was to provide the participants a comprehensive hands-on training on the bottom-up proteomics approaches. There were twenty-two participants, both research scholars and faculties who were from different Universities and Institutes. This four-day workshop was designed to cover four modules on the basics as well as experiments done routinely in the mass spectrometry based proteomics studies. As the workshop participants were a heterogeneous group in terms of their familiarity to Proteomics, the workshop started with an Introductory lecture on Proteomics by Prof. K. Dharmalingam. Subsequently, the participants were given hands-on training in the experiments such as protein quantitation, different methods of sample preparation and clean-up of samples for mass spectrometry analysis. Every participant was given the opportunity to do the experiments individually. Two days of the workshop were dedicated for providing training on analysis of MS data, both identification as well as quantitation of proteins using Proteome Discoverer and Pinpoint softwares. The workshop also included invited lectures by Prof. Balamurugan from Alagappa University, Karaikudi, Dr. Krishna Tej from Narayana Nethralaya, Bengaluru and Dr. Mahesh Kulkarni from National Chemical Laboratory, Pune. The workshop concluded with a discussion with the participants on their feedback as well as their expectations on future events.



Dr. Mahesh Kulkarni



Participants at work in the laboratory



National Symposium and Workshop On Advances in Proteomics

(NSWAP2016)

March 15-18, 2016

Institute of Life Sciences, Bhubaneswar, Odisha, India



Dr. Amol R. Suryawanshi--- Convener

Proteomics has emerged as an essential and popular tool in biological research due to their high throughput nature. Advances in Proteomics technologies have made it more useful in terms of their application in various areas of clinical and biological research. The National Symposium and Workshop on Advances in Proteomics (NSWAP2016) was conducted at Institute of Life sciences, Bhubaneswar, Odisha, India from March 15-18, 2016. This included one day Symposium on Mar 15, 2016 followed by a three day workshop from March 16-18, 2016. This event was also a part of March 18th as a Proteomics day celebration. This was supported by Proteomics Society-India (PSI) and Sciex, India.

The Symposium was mainly focused on the application of advanced high throughput proteomics techniques to different aspects of life sciences wherein several eminent invited speakers from different fields presented their research work and shared their knowledge and experiences. Total 85 delegates attended the symposium. They were mainly Ph.D. / M.D. Research Scholars and Faculties from Research Institutes, Universities and Medical colleges.



On behalf of ILS, Bhubaneswar and organizing team of NSWAP2016, Dr. Amol Suryawanshi, Convener of NSWAP2016 welcomed all the delegates and eminent speakers of the symposium and briefed the importance and objective behind organizing this event. He introduced session chairs Dr. Surekha Zingde, President, PSI and Prof. Abhijit Chakrabarti, Saha Institute of Nuclear Physics (SINP), Kolkata and requested them to proceed with the scientific talks of the Symposium.

Inaugural lecture of the Symposium was delivered by Dr. Surekha Zingde on “Proteomics Today: Approaches, Challenges and Expectations” wherein she covered journey of proteomics and provided a bird’s eye view of the evolution of the field of Proteomics from proteins. She also gave an overview of all the advanced Proteomics technologies presently used for various research areas which helped delegates to understand their applications. In addition, she also briefed about Proteomics Society, India and various activities being conducted for proteomics researchers.



Dr. Harsha Gowda from Institute of Bioinformatics, Bangalore presented a talk on “Proteomics to Decode Genomes and Identify Biomarkers and Therapeutic Targets” where he elaborated on a draft of human proteome using high resolution mass spectrometry. He explained how proteomics transformed the way of investigation of molecular mechanisms underlying various diseases and how quantitative proteomics tool have become powerful to identify potential biomarkers and therapeutic targets of various diseases including cancers. He also explained about the identification of Post-translational modifications and deciphering their role in signalling pathways.



Dr. Subhra Chakraborty from National Institute for Plant Genome Research (NIPGR), New Delhi covered the Plant proteomics area with more focus on Proteomics and New Biology: Understanding Nutrient & Immune Response in Plant. She also talked about proteo-metabolomics approach to understand the regulatory networks and metabolic pathways involved in increased protein synthesis and reserve accumulation and decrease in anti-nutrient in plants.



Prof. Abhijit Chakrabarti from SINP, Kolkata presented his work entitled, “Clinical Proteomics in Haematological Diseases”. He elaborated his clinical proteomics work in Sickle cell disease (SCD) and HbE β -thalassemia using clinical samples.



Dr. Suman Thakur from Centre for Cellular and Molecular Biology, Hyderabad talked on “Biomarker to Drug Discovery using Quantitative Proteomics”. He explained application of quantitative proteomics for development of novel anticancer drug against different cancers in culture cells and mouse models.



Dr. Srikanth Rapole from National Centre for Cell Science, Pune delivered a talk on “Quantitative Proteomics and Metabolomics for Cancer Biomarker Discovery”. He emphasized that Proteomics and metabolomics approaches are most powerful techniques in discovery novel biomarkers and metabolites involved in specific cellular processes for different cancers. Integration of proteomics and metabolomics can provide the altered biochemical pathways in cancer.



Dr. Dipankar Malakar from Sciex, India elaborated on various strategies for Protein Biomarker Discovery, Verification and Validation. He also described the labeled approach of iTRAQ and label free approach SWATH and its application.



Overall, all the scientific talks of symposium were highly motivating and encouraging for the participants. Symposium concluded with remark by session chairs and vote of thanks by the convener.

The Workshop was aimed to provide training to research scholars and young faculties working in the field of proteomics. Out of total 38 applications received, 12 participants from different parts of India were shortlisted which included seven PhD Scholars and five Young Scientists from different reputed Research Institutes and Universities. The content of the 3-day long intensive workshop was Introduction to proteomics, Basics of mass spectrometry, Workflow of a typical proteomics study, Protein identification / quantification by Mass Spectrometry (iTRAQ), 5800 MALDI TOF/TOF - A working model of high resolution mass spectrometer and Tandem mass spectrometry data analysis wherein main focus was to introduce, demonstrate and provide hands-on training for multiplex iTRAQ experiment and mass spectrometry-derived proteomic data analysis.



During this workshop on day one, participants were exposed in detail to theoretical understanding about basics of mass spectrometry, various workflows being used for protein identification and quantification, and iTRAQ approach. Further, they started with practicals and learned sample preparation for iTRAQ experiment, protein quantitation, and protein in-solution digestion. On day two, participants performed iTRAQ labelling, fractionation by strong cation exchange, desalting and purification of the fractions, separation of peptides by nanoLC and spotting on MALDI plate, acquisition of spectra by MALDI TOF/TOF. On day three, all the spectra acquired overnight were subjected for protein identification by data base searching using ProteinPilot V.5.0 (Sciex) Software. Further, they were taught about the data analysis and interpretation. During these days, experimental break time was utilized to explain about gel based traditional and DIGE approaches. Apart from that, many other advanced proteomics techniques such as label free SWATH analysis were also explained. Participants were highly motivated and found the workshop significant and very much helpful for beginners. However, participants felt that the frequency and duration of such workshop could have been more for a complete training. Workshop was concluded with valedictory function by awarding a workshop completion certificate to participants, Mementos as a token of



appreciation to Instructors and finally vote of thanks by Convener.



Delegates of the Symposium Day- March 15, 2016



Group photo of Workshop participants



Convener: Dr. Karutha S. Pandian

The Proteomics Day was celebrated at the Department of Biotechnology, Alagappa University on March 18th, 2016 in the Seminar Hall of the Department of Biotechnology, Science Campus with a focal theme “**Proteomics to understand bacterial infections**”. In deference to the invitation extended to the Biosciences Departments of Alagappa University and nearby Institutions, 120 participants comprising Faculty Members, Research Scholars and PG Students attended the meeting.

The meeting was organized with an objective to introduce 2D- Gel Electrophoresis & MALDI-TOF/TOF and update the latest developments in the area of Proteomics, so that the Research Scholars and PG Students can improve and exchange their ideas with Experts working with Proteomics tools on Proteomics Day meeting.

After registration, the demonstration on 2D and MALDI-TOF/TOF was given at 11.30 am by Prof. S. Karutha Pandian & Prof. K. Balamurugan and their team in the Proteomics Laboratory, Department of Biotechnology, Alagappa University.

The participants were then formally welcomed for the Proteomics Day Lecture by Prof. K. Balamurugan, Department of Biotechnology, Alagappa University. In his welcome address, he emphasized the importance of celebrating Proteomics Day and mentioned that understanding the important roles of Proteins and modern day proteomics tools are more important for all the scientific community, since it is a chance to understand the needs of the biological system, to solve any problems associated with bacterial infections now and in near future.

Prof. K. Dharmalingam, an eminent scientist working in the area of clinical proteomics delivered the Proteomics Day Lecture. He explained about the genesis of Proteomics Society of India (PSI), activities of PSI in the recent past and current scenario. He also mentioned about the efforts taken by Prof. Suman Kundu, Department of Biochemistry, University of Delhi-South Campus in bringing about a quality Journal in the name of 'Journal of Proteins and Proteomics' (JPP). He informed the audience that the JPP has been officially taken over by PSI on this day at a celebration at Delhi. He emphasized the importance of proteomics tools in analyzing the regulatory proteins during the protein expression analysis. He also explained the parameters required to analyze proteins using advanced Mass spectrometer tools. He further described the connectivity between clinical diseases, in particular with eye diseases associated with diabetics.

Dr. K. Rajagopal, Principal Scientist from Central Food and Technological Research Institute, Mysuru gave a lecture on his scientific achievement under the topic "Thrombolytics: a success story". He dwelled on the novel therapeutics developed by his group for dissolving blood clots in ischaemic heart patients. Furthermore, he also explained the basic details related to scientific patenting and marketing of the same in the future. In such a way he encouraged the scientific entrepreneurship among the young upcoming scientists.

After a short break for tea, Research Scholars working in the area of microbial proteomics presented their work as mini-oral presentations as detailed below.

Ms. A. Kamala Devi, a PhD Scholar with Prof. K. Balamurugan, Department of Biotechnology, Alagappa University presented her work under the title "System-level overview of changes in host proteome during *Klebsiella pneumoniae* infection in *Caenorhabditis elegans*"

Mr. S. Sethupathy who is pursuing his Doctoral programme under the supervision of Prof. S. Karutha Pandian, Department of Biotechnology, Alagappa University presented his work on "Proteomic analysis of *Pseudomonas aeruginosa* PAO1 to Quorum sensing inhibitors".

Mr. Ashwinkumar Subramenium, a Research Scholar with Prof. S. Karutha Pandian, explained his work on “Proteomic analysis of *Streptococcus pyogenes* treated with antibiofilm agent 3-Furancarboxaldehyde”.

Mr. S. Marudhupandiyam, who is pursuing his doctoral work under the supervision of Prof. K. Balamurugan presented a paper entitled ”Proteomics investigation of *Caenorhabditis elegans* during *Shigella flexneri* infection reveals drug targets for bacillary dysentery”.

Ms. U. Prithika, who is a PhD student working under the supervision of Prof. K. Balamurugan, presented her proteomics related research work under the title “Proteome analysis of *C. elegans* during sequential exposure of bacterial pathogens affects innate immune proteins”.

Mr. Parasanth Mani Iyer pursuing his PhD under the supervision of Prof. K. Balamurugan presented his proteomics work entitled “Analysis of ultraviolet-A mediated photoaging through proteomic approach in *Caenorhabditis elegans*”.

Mr. P. Muthuramalingam, pursuing his PhD under the guidance of Dr. M. Ramesh, Associate Professor, Department of Biotechnology, Alagappa University, presented his work entitled “An *in silico* perspective of stress signaling in rice”.

Finally, **Prof. S. Karutha Pandian** proposed a formal vote of thanks wherein he profusely thanked Prof. K. Dharmalingam who is an authority in proteomics and Dr. K. Rajagopal for having shared their rich experience and success stories to the budding proteomics scientists. Further, he appreciated the Scholars who have made mini-oral and poster presentations as the exercise paved the way for getting critical reviews/comments from experts. He profusely thanked the PSI for having provided funds for celebrating the Proteomics Day Celebrations at Alagappa University for the first time in a befitting manner.



Research Scholars explaining their research to the participants of the workshop.



Workshop on Mass Spectrometry

March 24, 2016

Department of Biochemistry, Indian Institute of Science, Bengaluru



Conveners : Prof. Utpal Tatu, Dept of Biochemistry, IISc Bengaluru & Vice President, Proteomics Society, India, and Dr. M. Rajyalakshmi, Professor & Head, Department of Biotechnology, B.M.S. College of Engineering, Bengaluru.

A workshop on Mass Spectrometry was organized by Proteomics Society of India on the 24th of March 2016 at Department of Biochemistry, IISc, Bangalore.

The objective of the workshop was to provide a detailed overview and current applications of 2-D Gel Electrophoresis Mass Spectrometry including practical demonstration for students pursuing education in the field of Biotechnology.

Three lecture sessions were conducted followed by demonstration of the techniques held in the previous sessions.

Session 1 (10 am to 11.30 am): Prof. Utpal S Tatu, Vice President, Proteomics Society, India (PSI). The session started off with a short introduction about PSI and its activities. A brief overview of the day's agenda was given along with an introduction to the topics that would be covered. Prof. Utpal S Tatu highlighted the ever-growing field of Genomics and Proteomics and provided an account of past and present research done in that field along with future prospects. The session was interactive and gave a lot to contemplate for the audience.

Session 2 (11.30 am to 1.30 pm): Ms. Saharanya Chatterjee, a PhD student at IISc under Prof. Utpal Tatu delivered a lecture on "Theory and practice of 2-D Gel Electrophoresis". She provided a systematic and detailed account of the technique of 2-D Gel Electrophoresis. The students were also introduced to the real world applications of this technique.

Session 3 (2 – 3 pm): Mr. Suraj Subramaniam, project fellow at Prof. Utpal Tatu Lab, briefed the students about the technique of Mass Spectrometry. A detailed overview was provided about working principles of

Mass Spectrometer, various methods of ionization and interpretation of the mass spectrometry derived peaks.

Session 4: Demonstration of 2D Gel Electrophoresis and Mass Spectrometry were conducted at Prof.Utpal Tatu lab, IISc. The students had an opportunity to get a glimpse of the instruments and their working.

Students Corner

A Panoramic tour into the world of proteomics

Sagarika Das

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Standing on a scientific station where I envision the red signals indicated to the trains waiting for their respective platforms of Genomics, Transcriptomics, Proteomics and Metabolomics ready to depart to their respective destinations, I wonder how in some time from now all of them will be crossing the same junction, each carrying bountiful data. Translating the metaphor in scientific language with the advances in the high throughput technologies in Modern Biology a new era of “Omics” has arrived. Each of the branches of “Omics”, namely Genomics, Transcriptomics, Proteomics, Metabolomics are inter-connected. The high throughput data of one relies on the other for validation, for further analysis, for generating network biology.

When scientific research is progressing at an accelerating rate in the rest of the World, India is matching its steps into the glory of research. To train the budding researchers in the cutting edge technology in Proteomics, the Institute of Life Sciences, Bhubaneswar organized a four day “National Symposium and Workshop on Advances in Proteomics”(NSWAP) from 15th- 18th March 2016 commemorating Proteomics Day in India. The programme was supported by Proteomics Society of India (PSI) and Sciex, India.

The symposium cum workshop was a huge success and highly appreciated by all the participants. Sharing the finer details of the events of the four day packed programme from my perspective would be lacking short of words as the chain of events were enriched by inspiring talks by eminent scientists of India working on proteomics on day 1 followed by the subsequent training and demonstration of iTRAQ Workflow.

The Symposium on Day 1 witnessed some of the finest scientists of India sharing their work on Proteomics on a common platform. A bird’s eye view of the evolution of the field of Proteomics from proteins was presented by Dr. Surekha M. Zingde, the Honourable President, Proteomics Society of India (PSI). Her impeccable introductory talk heralded the beginning of the 4 day symposium cum workshop. It

was followed by the rest of the interesting talks by Dr. Harsha Gowda who talked about how Proteomics can be used as a tool to decode genomes and identify biomarkers and therapeutic agents, Dr. Subhra Chakraborty who enlightened us with another fascinating talk on Understanding Nutrient and Immune Response in Plant, Dr. Abhijit Chakrabarti enthralled us by sharing his work on how proteomics can be used as a handy tool in understanding hematological diseases like Sickle cell disease and HbE β -thalassemia by integrating 2D Gel Electrophoresis, 2D DIGE and MALDI MS/MS based techniques, Dr. Suman S. Thakur discussed about Biomarker to Drug Discovery using Quantitative Proteomics, Dr. Dipankar Malakar on iTRAQ chemistry in Protein Biomarker Discovery Analysis and Dr. Srikanth Rapole who not only discussed his work on Quantitative Proteomics and Metabolomics for Cancer Biomarker Discovery but also marked the onset of the Workshop by discussing the basics of Proteomic Analysis like Two Dimensional Gel Electrophoresis, Two Dimensional Difference Gel Electrophoresis (2D-DIGE) and Matrix Assisted Laser Desorption Ionization Mass Spectrometry (MALDI), Electrospray Ionization Mass Spectrometry (ESI-MS), Mass Spectrometry based quantitative proteomic approaches like Stable isotope labeling by amino acids in cell culture (SILAC), Isobaric tags for relative and absolute quantitation (iTRAQ) and Label Free Quantitative Mass Spectrometry Analysis.

The Workshop was an amalgamation of talks and practical sessions. The Workshop was carried forward by Dr. Dipankar Malakar for next three days. The central theme of the workshop was iTRAQ workflow. The basics of iTRAQ chemistry were explained followed by the demonstration of protein identification workflow using standard digest in 5800 MALDI TOF /TOF, protein pilot software for routine protein identification. Thus the basic framework of the workshop was provided on Day 1 which helped the participants to get acquainted with the advances in proteomics. Also on Day 1 Trypsin digestion procedure using complex real life sample was demonstrated. On Day 2 the procedure of iTRAQ labeling and SCX fractionation was demonstrated. LC-MALDI spotting of two fractionated labeled fractions was performed and the spotted plate was submitted for overnight MALDI acquisition.

On Day 3 of the workshop the method of automatic MS and MS/MS acquisition procedure to perform iTRAQ labeled sample analysis and submission for data acquisition and Protein Pilot and Mascot analysis was demonstrated.

Overall the Symposium and Workshop was a grand success and highly informative for the learners. It will help us to incorporate the techniques of proteomics in our research work. Moreover, the lectures delivered were insightful. The sessions ended with Question/Answer and concluding remarks everyday. A valedictory function was held on the last day of workshop to mark the end of the workshop.

Before concluding my scientific experience of the workshop, I would like to appreciate the warm hospitality of the volunteers and the nice and comfortable stay in the campus of ILS, Bhubaneswar. It was a wonderful experience overall and I would thank Proteomics Society of India and acknowledge Dr. Amol R. Suryawanshi, the convenor of NSWAP 2016 for his painstaking efforts in making this event a grand success.

National Symposium and Workshop on Advances in Proteomics : A step towards human resource generation in Proteomics research & application in India

Arabinda Mahanty

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Proteomics has emerged as a technology that is being used in a wide range of domains of life science research and application; from plant to animals, virus to fungi. While other contemporary omics technologies like genomics and transcriptomics deals with structural attributes, proteomics deals with functional attributes of the characteristic feature of a cell/organism. However, being a not so economical technology, proteomics has not been used to its fullest potential in life science research at least in India. Consequently the human resource available in this field of science is scanty. In this context, NSWAP2016 organized by Institute of Life Sciences, Bhubaneswar with support from Proteomics Society of India and Sciex, India is an appreciable step towards generating capable human resource in this field.

The positives of NSWAP2016 can be summarized in the following points.

- ❖ The symposium brought about eminent proteomics researchers of the country working across various domains of life sciences to one platform and provided an opportunity to share their experience and motivate young researchers to pursue proteomics research.
- ❖ The workshop provided a hands on training on advanced proteomic techniques like gel based identification of proteins by MALDI TOF/ TOF -MS and non-gel based (iTRAQ) based protein identification and quantification techniques. This was particularly important for student researchers for some of whom, these techniques were confined only to their infant imagination till the start of workshop.
- ❖ Discussion sessions on more advanced label free techniques for protein identification and quantification were carried out during the workshop which provided glimpses of the advances achieved in proteomics research in the recent times.
- ❖ The workshop brought about an opportunity for the delegate researchers/scientist to discuss on highly specific issues pertaining to their individual research with the resource persons and fellow delegates. These kinds of discussions are necessary as it bring out innovative ideas to tackle the concerned issues.
- ❖ The symposium and workshop provided a platform for delegates/resource persons to collaborate between themselves which is an important attribute for getting success in research in the present day arena.

As a whole the symposium and workshop were both grand successes and would prove to be an important step in popularizing and developing proteomics research in India.

Upcoming Events

**8TH ANNUAL MEETING OF PROTEOMIC SOCIETY, INDIA
3RD MEETING OF ASIA OCEANIA AGRICULTURAL PROTEOMICS ORGANIZATION
8TH INTERNATIONAL SYMPOSIUM ON FRONTIERS IN AGRICULTURAL PROTEOME
RESEARCH**

**December 14-17, 2016
in New Delhi**

**ORGANIZED BY
PROTEOMICS SOCIETY, INDIA
ASIA OCEANIA AGRICULTURAL PROTEOMICS ORGANIZATION
AND
NATIONAL INSTITUTE OF PLANT GENOME RESEARCH**

**For more details keep track on PSI website
www.psindia.org**

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(Regd. No. 286/2009)
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